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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,051	03/22/2006	Bernard Hendrik Reesink	4872	8981

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BASF CATALYSTS LLC
100 CAMPUS DRIVE
FLORHAM PARK, NJ 07932

EXAMINER	
SINGH, PREM C	

ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
03/04/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTONotices@basf.com
linda.komorowski@basf.com
sonny.nkansa@basf.com

Office Action Summary	Application No.	Applicant(s)	
	10/573,051	REESINK ET AL.	
	Examiner	Art Unit	
	PREM C. SINGH	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,13 and 23-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,13 and 23-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Amendment to claim 1, cancellation of claim 11, and addition of new claims 23-32 is noted.

2. Applicant's election of Group I, claims 1-13 in the reply filed on 12/30/2009 is acknowledged. Because Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP §818.03(a)).

3. New ground of rejection necessitated by amendment to the claim and addition of new claims follows. Addition of new claims necessitated a new art, US Patent 5,223,470 (Cited by the Applicant in the IDS filed: 03/22/2006).

Claim Objections

4. Claims 25 and 27 are objected to because of the following informalities:

Claim 25 (last three lines): It is not clear from the claim language how the feedstock contacts an oxide of a metal: (1) during contact with the nickel adsorbent, (2) before contact with the nickel adsorbent, or (3) after contact with the nickel adsorbent.

Claim 27 (last two lines): -- "……an S-compound sulfur compound"-- should be re-worded.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-10, 12, 13, 23-25, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winsor et al (GB 1,144,498) in view of Kimber et al (US Patent 5,059,539).

8. With respect to claim 1, Winsor discloses a process for the removal of thiophenic sulfur compounds from aromatic hydrocarbons (See page 1, lines 10-13; page 2, lines 9-10, 14-15). The process comprises: contacting the feed stock in presence of hydrogen with sulfided nickel adsorbent (See page 1, lines 23-36, 60-61).

Winsor invention also discloses a partially sulfided nickel contact material having 10 wt% elemental nickel (See page 2, lines 53-56; page 4, lines 7-15) showing high sulfur capacity, prolonged activity (for 1300 hours) and substantially no hydrogenation activity (See page 4, lines 21-27). Obviously, Winsor invention uses a part of nickel in metal form.

Winsor invention does not specifically disclose rate constant for tetralin hydrogenation activity of the adsorbent.

Winsor discloses that the supported nickel used in the invention does not show appreciable hydrogenation of the aromatic hydrocarbons (See page 1, lines 50-54). Obviously, the supported nickel in the Winsor process has very low value of the rate constant. It is to be noted that rate constant for hydrogenation activity for an adsorbent or catalyst is a property which can be easily determined.

Kimber discloses test for catalyst activity in which naphthalene is reversibly hydrogenated (See abstract). Kimber elaborately discloses method of measuring catalyst activity for hydrogenation (See column 1, lines 49-68; column 2, lines 1-38).

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Winsor invention and determine the tetralin hydrogenation activity for the adsorbent used in the invention. It is expected that the rate constant in Winsor invention will necessarily be in a range as claimed by the Applicant because Winsor is using an adsorbent similar to the Applicant's claim.

Winsor invention does not appear to specifically disclose nickel adsorbent comprising a metal oxide, however, the invention does disclose using cobalt and molybdenum oxides for sulfur removal in a step before desulfurization with nickel adsorbent (See page 2, lines 30-45). Winsor also discloses that more than one stage of desulfurization using nickel adsorbent can be used (See page 2, lines 30-41). This indicates that cobalt and molybdenum oxides are also desulfurization agents which could be combined with the nickel adsorbent by one skilled in the art.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Winsor invention and use cobalt and molybdenum oxides along with nickel adsorbent for an enhanced desulfurization effect. According to MPEP, "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose" *In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980)*. Since Winsor uses a nickel adsorbent, metal oxide, feed, and

operating conditions as claimed, it is expected that the metal oxides in Winsor invention will necessarily form stable sulfides, as claimed.

9. With respect to claim 2, as discussed earlier, Winsor invention discloses a partially sulfided nickel contact material having 10 wt% elemental nickel (See page 2, lines 53-56; page 4, lines 7-15). Winsor further discloses nickel content from 1 to 50 wt% (expressed as the element) (See page 2, lines 84-87).

10. With respect to claim 3, Winsor invention discloses atomic S to Ni ratio of at least 0.75 (See page 1, line 78).

11. With respect to claims 4-6, Winsor invention discloses that the supported nickel material used in the present process may be prepared in any of the known ways (See page 2, lines 72-74). Winsor further discloses the details of the process of making nickel adsorbent, indicating that the preferred sulfur compounds are thiophenes (See page 2, lines 84-92; page 3, lines 18- 66; 113-120; page 4, lines 2-6). Thus, it would have been obvious to one skilled in the art at the time the invention made to use the claimed steps because it is expected that the adsorbent produced by Winsor will be structurally and functionally similar to the claimed adsorbent.

12. With respect to claims 7 and 13, Winsor invention discloses hydrogen partial pressure from 0 to 2000 psig (0 to 138 bar) and temperature between 50 and 316°C (See Table: page 2, between lines 59 and 60).

13. With respect to claim 8, Winsor invention discloses benzene as the feedstock (See page 2, lines 9-10).

14. With respect to claim 9, Winsor invention discloses that nickel adsorbent comprises nickel that is present on a support material (See page 2, lines 72-75).

15. With respect to claim 10, Winsor invention discloses using a fixed bed process (See page 2, lines 93-97; page 3, lines 1-5).

16. With respect to claim 12, Winsor invention discloses using cobalt and molybdenum oxides for sulfur removal in a step before desulfurization with nickel adsorbent. Winsor also discloses that more than one stage of desulfurization using nickel adsorbent can be used (See page 2, lines 30-45).

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Winsor invention and use the cobalt and molybdenum oxides in a subsequent step to capture additional sulfur from hydrocarbon feed. See *In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)* (selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected

results); Also, see *In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930)*. It is further known to those skilled in the art that cobalt and molybdenum oxides, upon reaction with sulfur compounds in the hydrocarbon, produce corresponding stable sulfides.

17. With respect to claims 23 and 24, Winsor invention discloses, "The supported nickel material used in the present process may be prepared in any of the known ways and may incorporate any of the known natural or synthetic materials, such as refractory oxides of the elements of Groups II to V of the Periodic Table" (Page 2, lines 72-77). It is to be noted that silicon belongs to Group IV A. It is also to be noted that co-precipitation, calcining and reduction of the catalyst are standard and routine steps used in the preparation of the adsorbent.

18. Claim 25 has all the limitations of claim 1 and additionally requires: at least 10% nickel present in the metallic form, nickel surface having an atomic ratio of S to Ni of at least 0.5, and contacting the feedstock with an oxide of a metal that forms stable sulfides under the conditions applied in the process for the removal of contaminating sulfur compounds using the sulfided nickel adsorbent from the hydrocarbon feedstock.

Limitations of claim 1 have been discussed earlier.

Winsor further discloses at least 10 wt% nickel in metallic form (See page 4, lines 7-19) and atomic ratio of S to Ni in a range including as claimed (See page 4 Table 1). Winsor also discloses contacting the feedstock with cobalt and molybdenum oxides for the removal of contaminating sulfur compounds before using the sulfided nickel

adsorbent from the hydrocarbon feedstock (See page 2, lines 30-45). It is to be noted that cobalt and molybdenum oxides upon reaction with sulfur compounds, will form stable sulfides.

19. With respect to claims 31 and 32, Winsor invention discloses temperature between 50 and 316°C (See Table: page 2, between lines 59 and 60). Winsor invention also discloses using a fixed bed process (See page 2, lines 93-97; page 3, lines 1-5).

20. Claims 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winsor et al (GB 1,144,498) in view of Kimber et al (US Patent 5,059,539) and further in view of Bouwman et al (US Patent 5,223,470).

21. With respect to claims 26-28, Winsor invention discloses, "The supported nickel material used in the present process may be prepared in any of the known ways and may incorporate any of the known natural or synthetic materials, such as refractory oxides of the elements of Groups II to V of the Periodic Table" (Page 2, lines 72-77).

Winsor invention does not appear to specifically disclose the details of preparing nickel adsorbent.

Bouwman discloses preparation of sulfur-promoted nickel catalyst on alumina (See title and abstract). Bouwman also discloses preparation of nickel catalyst by co-

precipitating it with sulfur compounds including sulfides and thiophenes (See column 3, lines 17-54).

Thus, it would have been obvious to one skilled in the art at the time of invention to specify the details of preparing nickel adsorbent in Winsor invention which is expected to be similar to the steps as disclosed by Bouwman.

22. With respect to claims 29 and 30, Winsor invention discloses, "The supported nickel material used in the present process may be prepared in any of the known ways and may incorporate any of the known natural or synthetic materials, such as refractory oxides of the elements of Groups II to V of the Periodic Table" (Page 2, lines 72-77). It is to be noted that silicon belongs to Group IV A. It is also to be noted that co-precipitation, calcining and reduction of the catalyst are standard and routine steps used in the preparation of the adsorbent (See Bouwman, column 3, lines 17-54).

Response to Arguments

23. Applicant's arguments filed 12/30/2009 have been fully considered but they are not persuasive.

24. In the arguments on page 7, the Applicant argues that it would NOT have been obvious to one skilled in the art to modify the sulfided nickel of Winsor by including cobalt and molybdenum oxides to arrive at the claimed invention. Winsor merely

teaches that other process employing cobalt and molybdenum oxides can be used "before" feedstock is desulfurized by Winsor's process or that Winsor's process is repeated more than once. *See* page 2, lines 30-39 of Winsor. Winsor does not teach or suggest that metal oxides are included in a sulfided nickel adsorbent. Moreover, claim 1 recites the nickel adsorbent comprises an oxide of a metal that forms stable sulfides under the conditions applied in the process for the removal of contaminating sulfur compounds from hydrocarbon feedstock. It is unpredictable that a metal oxide can form stable sulfides under the conditions applied in the sulfided nickel adsorbent process.

The Applicant's argument is not persuasive because Winsor discloses a nickel adsorbent as claimed. Winsor also discloses that metal oxides can be used before the adsorbent. This clearly indicates that nickel adsorbent and metal oxides are desulfurizing agents which could be combined by one skilled in the art. "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose" *In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980)*. Winsor uses a nickel adsorbent, metal oxide, feed, and operating conditions identical to the claimed invention, therefore, it is expected that the metal oxides in Winsor invention will necessarily form stable sulfides, as claimed.

25. In the arguments on page 7-8, the Applicant argues that no where does Winsor teach or suggest a sulfided nickel adsorbent with a part of nickel in a metal form. Moreover, it is respectfully requested that the Examiner identify a factual support

in Winsor that obviously teaches a part of nickel of sulfided adsorbent in metal form.

The Applicant's argument is not persuasive because Winsor discloses use of an adsorbent with 10 wt% elemental nickel on sepiolite which has been presulfided with thiophene (See page 4, lines 7-14; page 5, claim 4).

26. In the arguments on page 8, the Applicant argues that Kimber does not relate to a method of measuring a hydrogenation activity for sulfided nickel adsorbent. Therefore, it would NOT have been obvious to one skilled in the art to modify Winsor invention and determine a tetralin hydrogenation activity for the adsorbent of Winsor. Also, it is NOT expected that the rate constant of Winsor's sulfided nickel for tetralin hydrogenation activity will necessarily be in a range as claimed by the Applicant. No where does Winsor teach or suggest a rate constant of Winsor's sulfided nickel for tetralin hydrogenation activity. A rate constant of Winsor's sulfided nickel for tetralin hydrogenation activity may or may not be in a range as claimed. The probability of such characteristic, however, is not sufficient to establish the inherency of that characteristic.

The Applicant's argument is not persuasive because Winsor discloses that nickel has no aromatic hydrogenating activity at the temperature and pressure used in the process (See page 1, lines 63-65, emphasis added). Clearly, the rate constant for hydrogenation will be approaching zero. Thus, it is expected that the rate constant for tetralin hydrogenation in Winsor's process will necessarily be in a range as claimed because Winsor's adsorbent is identical to the claimed adsorbent. Kimber reference has

been used only to show how rate constant for a hydrogenation process is determined (See column 1, lines 64-68; column 2, lines 1-2; figure2, 3).

27. In the arguments on page 9-11, the Applicant argues that claim 3 recites "a *nickel surface has an atomic S to Ni ratio of at least 0.5."* The Office Action contends on page 7 that "Winsor invention discloses atomic S to Ni ratio of at least 0.75 *(See* page 1, line 78)." Winsor teaches that an "upper limit" of sulfur- nickel ratio is 0.2:1. *See* page 2, lines 1-3 of Winsor. Page 1, line 78 of Winsor merely teaches that if Winsor's nickel will continue to absorb sulfur, the nickel contains sulfur up to a ratio of 0.75:1. Therefore, Winsor fails to teach or suggest a process for removal of contaminating sulfur compounds involving a sulfided nickel adsorbent, wherein the nickel surface has an atomic S to Ni ratio of at least 0.5. For this additional reason, Winsor cannot render claim 3 obvious. Even if a *prima facie* case of obviousness is established, which is not conceded, the following experimental data demonstrates that a process in accordance with the claims has superior and unexpected properties compared to processes outside the scope of the claims. In particular, the experiments compare percentages of conversion of DBT to stable sulfides and conversion of 4,6,-DMDBT to stable sulfides with a process involving a sulfided nickel adsorbent containing a metal oxide and a process involving a sulfided nickel adsorbent lacking a metal oxide. Figs. 1 and 2 indicate that the sulfided nickel adsorbent containing a metal oxide in accordance with the claimed invention has significantly higher percentage of conversion than the sulfided nickel adsorbent lacking a metal oxide.

The Applicant's argument is not persuasive because Winsor discloses, "It has been found that such partially sulphided nickel will continue to absorb sulphur under suitable conditions to a level of at least 0.75:1. Pre-sulphiding to a level above 0.1:1 will not thus render the invention inoperable, but clearly presulphiding to above the minimum level reduces the total desulphurisation capacity. The preferred upper limit is thus 0.2:1" (Page 1, lines75-82; page 2, line 1). Winsor further discloses a relationship between S/Ni ratio and % desulfurization (See page 4, Table 1). The Table clearly indicates maximum desulfurization corresponding to S/Ni ratio between 0.3 and 0.4. The desulfurization is still at a level of 88% for S/Ni ratio of 0.5 and at a level of 70% for S/Ni ratio of 0.748. Obviously, one skilled in the art could operate the process at S/Ni ratio of 0.748 and still achieve a deulfurization of 70%. Comparison of experiments conducted on the conversion of DBT and 4, 6,-DMDBT to stable sulfides using sulfided nickel adsorbent with and without a metal oxide are expected to give similar results with Winsor process also because Winsor is using a partially sulfided nickel adsorbent and metal oxide (cobalt and molybdenum oxides) as claimed. The Applicant is also using a partially sulfided nickel adsorbent and metal oxide. The Applicant's cited prior art, US Patent 5,482,616 (See Specifications: page 5, lines 15-22) uses metal oxides including cobalt and molybdenum oxides (used by Winsor) and nickel and zinc oxides (used by the Applicant in the comparative experiment). Patent '616 also discloses that the used oxides form stable sulfides under process conditions (See column 3, lines 3-9). Clearly, Winsor should also be achieving similar results as argued by the Applicant.

28. In conclusion, the claimed invention is *prima facie* obvious over Winsor in view of Kimber and Bouwman.

Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS 022610

/Glenn A Caldarola/
Supervisory Patent Examiner, Art Unit 1797